

SN 09/973,170

Docket No. S-97,774

In Response to Office Action dated September 9, 2003

#### REMARKS

Claims 1-8 are pending in the present patent application. Claims 1-8 have been rejected. The specification has been objected to.

According to the present Office Action, the disclosure has been objected to because the reference to Janssen et al at line 19 of page 12 is incomplete. Applicant has completed the reference (by copying it from U.S. Provisional Patent Application Serial Number 60/016,093, filed July 8, 1996) and is providing a hardcopy of Janssen to complete the file, in accordance with the present Office Action.

According to the present Office Action, claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, because the abbreviation "dc" should be replaced with "DC". Applicant has replaced "dc" with "DC". The Office Action also states that the claims should reflect that the grating of the invention is a transient grating and is ultrafast and produced by femtosecond NDFWM, and is not the type of longer-term grating of the prior art. Applicant has amended claims 1-8 to read "...method for *femtosecond nondegenerate four-wave mixing in charge transfer materials to produce an ultrafast, transient holographic grating...*". Step (b) of claim 1 also indicates that femtosecond scale pulses are used and that the holographic grating produced using these pulses is an ultrafast, transient grating. With these changes, Applicant respectfully requests that the rejections of claim 1-8 under 35 USC 112, second paragraph, be withdrawn.

According to the present Office Action, claims 1-8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement because "...the current language does not limit the claimed invention to the transient gratings or the method to femtosecond NDFWM, which the disclosure is limited to. The Examiner notes that limiting the claims to femtosecond non-degenerate four wave mixing (Spec. at page 1/lines 7-8) producing ultrafast or dynamic gratings would also serve to obviate at least some of the prior art rejections appearing below...". Applicant has amended claims 1-8 to read "...method for *femtosecond nondegenerate four-wave mixing in charge transfer materials to produce an ultrafast, transient holographic grating...*". Step (b) of claim 1 also indicates that femtosecond scale pulses are used and that the holographic grating produced using these pulses is an ultrafast, transient grating. With

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these changes, Applicant respectfully requests that the rejection of claim 1-8 under 35 USC 112, first paragraph, be withdrawn.

Claims 1-8 are also rejected under 35 U.S.C. 102(b) as being fully anticipated by Maniloff et al., "Charge transfer polymers: a new class of materials for non-linear Optics", SPIE Vol. 2854 (08/1996) pp. 208-213. According to the present Office Action, "...the removal of the language added to the claims ("...such that ...charge transfer occurs...in the absence of an externally applied dc field..") would obviate this rejection as this would bring the scope of coverage sought to be commensurate in scope with the disclosure of the parent applications and accord the claim the earliest filing date of those applications. (60/016,093 filed 07/08/96)...". Applicant has removed the language from claim 1 that the charge transfer that occurs between donor and acceptor also occurs *in the absence of the applied DC field*. With this change, the claim should be accorded the earliest filing date (i.e. that of 60/016,093). With these changes, Applicant respectfully requests that the rejection of claims 1-8 under 35 USC 102(b) in view of Maniloff et al. be withdrawn.

Claims 1-4 "...are rejected under 35 U.S.C. 102(b) as being fully anticipated by Prasad et al., "Polymeric composite photorefractive materials for nonlinear optical applications", SPIE Vol. 2143, pp. 80-86. According to the Office Action, Prasad et al. "...describes a mixture of polyvinylcarbazole, 4-(N,N-diethylamino)-beta-nitrostyrene (DEANST) and either 4-(4-dimethylaminophenyl)-2,6-diphenylthiapyrylium perchlorate (TPY) or fullerene (C<sub>60</sub>) cast onto ITO coated glass substrates. A field was applied and a grating formed using 703 nm (for the TPY) or 645 nm (for the fullerene) radiation from an argon ion pumped Ti-Sapphire with powers of 0.62 and 0.57 W/cm<sup>2</sup>. The grating was read with a HeNe laser at 633 nm. (page 84). The same experiment appears to have been conducted for the fullerene sensitized solution, which describes a diffraction efficiency of 1.1% with an applied field. The examiner notes that the claims do not preclude the use of an electric field in the NDFWM process, but requires the materials to be able to undergo the charge transfer in the absence of the applied field. The Examiner notes that the experimental conditions of the instant application use a similar experimental set-up to that disclosed by Prasad et al..." but that "...the Ti:Sapphire produces 3 microjoule pulses with a length of 150 femtoseconds. This translates to (3 x

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$10^{-6}$  J divided by  $150 \times 10^{-15}$  seconds)  $2 \times 10^7$  W, which is more than 7 orders of magnitude larger than that used in the reference (page 8/line18-page9/line 19) and is shown in figure 4 to last on the order of 10 picoseconds ( $10^{-12}$  sec). The separation between the writing wavelengths and the probe beam are too close for the fullerene (12 nm) to hold that that the probe/measurement wavelength is not absorbed by the fullerene. Therefore, the claims reciting the presence of a fullerene are not rejected under this heading. **This rejection and those below based in part on Prasad et al. would be obviated by the addition of language that limiting the claims to femtosecond non-degenerate four wave mixing (Spec. at page 1/lines 7-8) producing ultrafast or dynamic gratings...".** Applicant has amended claims 1-8 to read "...method for *femtosecond* nondegenerate four-wave mixing in charge transfer materials *to produce an ultrafast, transient holographic grating...*". Step (b) of claim 1 also indicates that femtosecond scale pulses are used and that the holographic grating produced using these pulses is an ultrafast or transient grating. With these changes, Applicant respectfully requests that the rejection of claim 1-4 under 35 U.S.C. 102(b) in view of Prasad et al., "Polymeric composite photorefractive materials for nonlinear optical applications", SPIE Vol. 2143, pp. 80-86, be withdrawn.

Claims 1, 2, 4-5 and 11 "...are rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228...". According to the present Office Action as previously stated, this rejection would be obviated by the addition of language that limits the claims to femtosecond non-degenerate four wave mixing (Spec. at page 1/lines 7-8) producing ultrafast or dynamic gratings. Applicant has amended claims 1-8 to read "...method for *femtosecond* nondegenerate four-wave mixing in charge transfer materials *to produce an ultrafast, transient holographic grating...*". Step (b) of claim 1 also indicates that femtosecond scale pulses are used and that the holographic grating produced using these pulses is an ultrafast, transient grating. With these changes, Applicant respectfully requests that the rejection of claims 1, 2, 4-5 and 11 under 35 U.S.C. 103(a) over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 be withdrawn.

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Claims 1-6 and 8 "...are rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 and Bjorklund et al. '148. Bjorklund et al. According to the present Office Action, this rejection would be obviated by the addition of language that limited the claims to femtosecond non-degenerate four wave mixing (Spec. at page 1/lines 7-8) producing ultrafast or dynamic gratings. Applicant has amended claims 1-8 to read "...method for *femtosecond nondegenerate four-wave mixing in charge transfer materials to produce an ultrafast, transient holographic grating...*". Step (b) of claim 1 also indicates that femtosecond scale pulses are used and that the holographic grating produced using these pulses is an ultrafast or transient grating. With these changes, Applicant respectfully requests that the rejection of claims 1-6 and 8 under 35 U.S.C. 103(a) over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 and Bjorklund et al. '148 be withdrawn.

Claims 1-6 and 8 "...are rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 and DuCharme et al. '264. According to the present Office Action, this rejection would be obviated by the addition of language that limited the claims to femtosecond non-degenerate four wave mixing (Spec. at page 1/lines 7-8) producing ultrafast or dynamic gratings. Applicant has amended claims 1-8 to read "...method for *femtosecond nondegenerate four-wave mixing in charge transfer materials to produce an ultrafast, transient holographic grating...*". Step (b) of claim 1 also indicates that femtosecond scale pulses are used and also that the holographic grating produced using these pulses is an ultrafast, transient grating. With these changes, Applicant respectfully requests that the rejection of claims 1-6 and 8 under 35 U.S.C. 103(a) over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 and DuCharme et al. '264 be withdrawn.

Claims 1-8 "...are rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 and Bjorklund et al.

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'148, as applied to claims cited above, and further in view of Hari et al. JP 07-316548 or Sariciftci et al. '880...". According to the present Office Action, this rejection would be obviated by the addition of language that limited the claims to femtosecond non-degenerate four wave mixing (Spec. at page 1/lines 7-8) producing ultrafast or dynamic gratings. Applicant has amended claims 1-8 to read "...method for *femtosecond nondegenerate four-wave mixing in charge transfer materials to produce an ultrafast, transient holographic grating...*". Step (b) of claim 1 also indicates that femtosecond scale pulses are used and that the holographic grating produced using these pulses is an ultrafast, transient grating. With these changes, Applicant respectfully requests that the rejection of claims 1-6 and 8 under 35 U.S.C. 103(a) over Prasad et al. "Polymeric composite photorefractive materials for non-linear optical applications" SPIE Vol. 2143, pp 80-87, in view of Liu et al. '228 and Bjorklund et al. '148, and Hari et al. JP 07-316548 or Sariciftci et al. '880 be withdrawn.

Applicant respectfully requests that this amendment be entered into the present patent application.

For the reasons set forth above, Applicant believe that all currently pending claims are in condition for allowance, and such action at an early date is earnestly solicited. No new matter has been added by the above changes. Reexamination and reconsideration are respectfully requested.

Respectfully submitted,

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